

**WHAT IS CLAIMED IS:**

- 1 1. A gas sensor comprising:  
2 a sensor element formed of a solid electrolyte having an oxygen ion  
3 conductivity;  
4 a cathode and an anode, each formed of a porous metal material and each  
5 formed on the sensor element, to produce a pumping current reflecting a  
6 concentration of a detection component in a measurement gas when a predetermined  
7 voltage is applied between the cathode and the anode, the detection component  
8 comprising oxygen, the measurement gas contacting the cathode; and  
9 a gas diffusion control to vary the oxygen pumping current in accordance with  
10 a pressure of the measurement gas by controlling a diffusion of the measurement gas,  
11 the measurement gas moving from a measurement atmosphere toward the cathode by  
12 way of the gas diffusion control, to thereby obtain information on the pressure of the  
13 measurement gas based on the oxygen pumping current.
- 1 2. The gas sensor as claimed in claim 1, in which the gas diffusion control is a  
2 porous body having a bore diameter in a range from 0.01  $\mu\text{m}$  to 1  $\mu\text{m}$ .
- 1 3. The gas sensor as claimed in claim 2, in which the diffusion which is so  
2 controlled by the gas diffusion control as to vary the oxygen pumping current in  
3 accordance with the pressure of the measurement gas is Knudsen diffusion.
- 1 4. The gas sensor as claimed in claim 3, in which the porous metal material of  
2 each of the cathode and the anode is a platinum material which is one of platinum  
3 and platinum alloy.
- 1 5. The gas sensor as claimed in claim 4, in which the porous metal material of the  
2 anode is a palladium material which is one of palladium and palladium alloy.
- 1 6. The gas sensor as claimed in claim 5, in which the oxygen pumping current  
2 corresponds to the pressure of the measurement gas substantially on one-to-one basis  
3 when the concentration of the oxygen contained in the measurement gas is constant.

1 7. The gas sensor as claimed in claim 1, in which the gas sensor comprises a  
2 plurality of the cathodes as different pressure dependency electrodes, and a plurality  
3 of the gas diffusion controls, each of the different pressure dependency electrodes  
4 corresponding to one of the respective gas diffusion controls; in which the gas  
5 diffusion controls are so adjusted in terms of gas diffusion resistance as to make a  
6 difference between the corresponding different pressure dependency electrodes in  
7 terms of pressure dependency of the oxygen pumping current to be outputted; and in  
8 which the information on the pressure of the measurement gas is generated based on  
9 the oxygen pumping current outputted from each of the different pressure  
10 dependency electrodes.

1 8. The gas sensor as claimed in claim 7, in which information on the  
2 concentration of the oxygen of the measurement gas, in addition to the information  
3 on the pressure of the measurement gas, is obtained based on the oxygen pumping  
4 current outputted from each of the different pressure dependency electrodes.

1 9. The gas sensor as claimed in claim 7, in which the different pressure  
2 dependency electrodes comprise a first cathode and a second cathode, the outputted  
3 oxygen pumping current being more pressure dependent at the second cathode than  
4 at the first cathode, and in which a difference in the outputted oxygen pumping  
5 current between the first cathode and the second cathode is outputted as the  
6 information on the pressure of the measurement gas.

1 10. The gas sensor as claimed in claim 9, in which the outputted oxygen pumping  
2 current at the first cathode is obtained as the information on the concentration of the  
3 oxygen of the measurement gas.

1 11. The gas sensor as claimed in claim 7, in which each of the gas diffusion  
2 controls corresponding to one of the respective cathodes is formed with a gas vent so  
3 as to introduce the measurement gas to one of the respective cathodes, and in which  
4 a diffusing power for the measurement gas is adjusted in accordance with a bore  
5 diameter of the gas vent.

1 12. The gas sensor as claimed in claim 11, in which the gas vent of the gas  
2 diffusion control of the first cathode has the bore diameter in a range from 3  $\mu\text{m}$  to  
3 3,000  $\mu\text{m}$ , the outputted oxygen pumping current being less pressure dependent at  
4 the first cathode than at the second cathode.

1 13. The gas sensor as claimed in claim 12, in which the diffusion at the gas  
2 diffusion control of the first cathode is a free diffusion, and in which the oxygen  
3 pumping current detected at the gas diffusion control of the first cathode corresponds  
4 to the concentration of the oxygen of the measurement gas substantially on one-to-  
5 one basis.

1 14. The gas sensor as claimed in claim 7, in which the gas sensor is a pressure  
2 sensor.

1 15. The gas sensor as claimed in claim 14, in which the anode of the pressure  
2 sensor is common to the plurality of the cathodes.

1 16. A sensor unit comprising a pressure sensor, the pressure sensor comprising:  
2 a sensor element formed of a solid electrolyte having an oxygen ion  
3 conductivity;  
4 a cathode and an anode, each formed of a porous metal material and each  
5 formed on the sensor element, to produce a pumping current reflecting a  
6 concentration of a detection component in a measurement gas when a predetermined  
7 voltage is applied between the cathode and the anode, the detection component  
8 comprising oxygen, the measurement gas contacting the cathode; and  
9 a gas diffusion control to vary the oxygen pumping current in accordance with  
10 a pressure of the measurement gas by controlling a diffusion of the measurement gas,  
11 the measurement gas moving from a measurement atmosphere toward the cathode by  
12 way of the gas diffusion control, to thereby obtain information on the pressure of the  
13 measurement gas based on the oxygen pumping current.

14 in which the sensor unit generates and outputs information on an atmospheric  
15 pressure and an altitude based on the information on the pressure obtained by the  
16 pressure sensor.

1 17. The sensor unit as claimed in claim 16, in which the pressure sensor comprises  
2 a plurality of the cathodes as different pressure dependency electrodes, and a  
3 plurality of the gas diffusion controls, each of the different pressure dependency  
4 electrodes corresponding to one of the respective gas diffusion controls; in which the  
5 gas diffusion controls are so adjusted in terms of gas diffusion resistance as to make  
6 a difference between the corresponding different pressure dependency electrodes in  
7 terms of pressure dependency of the oxygen pumping current to be outputted; and in  
8 which the information on the pressure of the measurement gas is generated based on  
9 the oxygen pumping current outputted from each of the different pressure  
10 dependency electrodes.

1 18. The sensor unit as claimed in claim 17, in which the anode of the pressure  
2 sensor is common to the plurality of the cathodes.